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Small craft — Personal watercraft — Construction and system installation requirements

Petits navires — Véhicules nautiques à moteur — Exigences de construction et d'installation des systèmes

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 188, *Small craft*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 464, *Small craft*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 13590:2003), which has been technically revised.

The main changes are as follows:

— in Clause 1, it has been clarified that outboard powered personal watercraft and jet powered surfboards are outside the scope of this document;

— comparing all values to SAE and industry standards;

— using the single term "craft's ground" for both "earthed" and "ground";

— requirements for watercraft identification have been added in new Clause 5;

— requirements for cellular plastic used to encase metallic fuel tanks have been removed (former 5.2.2);

— requirements for plastic-encased metallic fuel tanks have been removed (former 5.3.2);

— requirements for carburettors have been removed (former 5.6);

— the fuel fill system grounding value in 6.13 has been corrected;

— requirements for propulsion engine cut-off device have been added in new Clause 13;

— requirements for off throttle steering when underway have been added in Clause 16;

— requirements for the owner's manual have been added in Clause 18;

— off-throttle steering testing methods have been added in new Annex A.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Small craft — Personal watercraft — Construction and system installation requirements

1 Scope

This document specifies construction and system installation requirements for personal watercraft. It addresses the builder's plate, watercraft identification, permanently installed petrol fuel systems, electrical systems, steering systems, ventilation, hull structure and floatation, stability, mooring and towing, flooding, off-throttle steering and the owner's manual.

This document does not apply to outboard powered personal watercraft and jet powered surfboards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1817:2022, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 7326:2016, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 7840:2021, *Small craft — Fire-resistant fuel hoses*

ISO 8469:2021, *Small craft — Non-fire-resistant fuel hoses*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
personal watercraft
watercraft intended for sports and leisure purposes, of less than 4 m in hull length, which uses a propulsion engine having a water jet pump as its primary source of propulsion and is designed to be operated by a person or persons sitting, standing, or kneeling on, rather than within the confines of a hull

Note 1 to entry: The measurement methodology for the length of hull is defined in ISO 8666.

3.2
fuel system
entire assembly of the fuel fill, vent, tank and distribution components, including but not limited to pumps, valves, strainers, and filters

3.3
static floating position
condition in which a personal watercraft floats in calm water, with each fuel tank filled to its rated capacity, but with no person or items of portable equipment on board

3.4
conduit
any type of rigid plastic or metal piping or tubing that supports the conductors contained within

3.5
sheath
material used as a continuous protective covering, such as electrical tape, moulded rubber, moulded plastic or flexible tubing, around one or more insulated conductors

3.6
open to the atmosphere
space or compartment that has at least 0,34 m^2 of open area directly exposed to the atmosphere for each cubic metre of net compartment volume

3.7
engine compartment
space where the engine is permanently installed

3.8
bilge
area, excluding *engine compartments* (3.7), in the personal watercraft, below a height of 100 mm measured from the lowest point in the personal watercraft, where liquid can collect when the personal watercraft is in its *static floating position* (3.3)

3.9
engine compartment bilge
space in the *engine compartment* (3.7) or a connected compartment, below a height of 300 mm measured from the lowest point, where liquid can collect when the personal watercraft is in its *static floating position* (3.3)

3.10
builder's plate
label or plate to display basic user information related to the personal watercraft

3.11
handlebar
mechanical means for applying manual steering effort into the connected *helm* (3.12), normally a horizontal configuration with hand grips at each end

3.12
helm
mechanism, exclusive of *handlebars* (3.11) or other means for manual application of a controlling force, by which the controlling force is fed into a personal watercraft steering system

3.13
craft's ground
ground that is established by a conducting connection (intended or accidental) with the common ground (potential of the earth's surface), including any conductive part of the wetted surface of the hull

Note 1 to entry: "Ground" is also known as "earth".

[SOURCE: ISO 10088:—[1)], 3.12]

1) Under preparation. Stage at the time of publication: ISO/FDIS 10088:2021.

3.14
normal accumulation of bilge water
minor amounts of water collecting in the *bilge* (3.8) from spray, rain seepage and spillage that can be removed by bilge pumps

Note 1 to entry: The height of the normal accumulation of bilge water is below the lowest part of the engine, or measured at the top of the bilge pump inlet or the bilge pump automatic float switch.

3.15
accessible
capable of being reached for inspection, removal or maintenance without removal of permanent craft structure

3.16
readily accessible
capable of being reached for use, inspection, removal or maintenance without the use of tools

3.17
propulsion engine cut-off device
switch or other system that, when activated in an emergency, provides the means to shut off the mechanical propulsion system

3.18 Terms related to the off-throttle testing (see Annex A)

3.18.1
advance
distance travelled along an extension of a previous straight line course measured from the completion of steer input

3.18.2
apex marker
test triangle (3.18.7) marker closest to the *turn markers* (3.18.9)

3.18.3
entrance chute
area of the test course between the *gate markers* (3.18.4) and the *turn markers* (3.18.9)

3.18.4
gate marker
marker at the beginning of the *entrance chute* (3.18.3)

3.18.5
off throttle condition
condition where the forward thrust throttle is completely released by the operator and the engine returns to idle

3.18.6
off throttle steering
any means provided with the personal watercraft that allows manoeuvring of the craft in an *off throttle condition* (3.18.5)

3.18.7
test triangle
area, outlined by markers, that the personal watercraft is not meant to enter during the test

3.18.8
transfer
perpendicular distance from an extension of a previously straight line course

3.18.9
turn marker
marker at the end of the *entrance chute* (3.18.3)

4 Builder's plate

Personal watercraft shall display a permanently installed builder's plate.

NOTE Requirements for builder's plate are found in ISO 14945.

5 Watercraft identification

Personal watercraft shall display a permanent identification number.

NOTE 1 The identification number is subject to certain international as well as national regulations.

NOTE 2 Requirements for the identification number are found in ISO 10087.

6 Fuel system

6.1 General

6.1.1 Each fuel system fitting, joint and connection shall be accessible.

6.1.2 The fuel system shall be designed not to leak liquid fuel into the personal watercraft when

a) the personal watercraft is overturned through 180° of roll in either direction, or

b) the personal watercraft is overturned through 90° of pitch in either direction.

6.1.3 The fuel system shall be designed not to leak liquid fuel into the personal watercraft when subjected to the greater of the following two values: 20 kPa or 1,5 times the highest hydrostatic pressure to which the component can be subjected in service.

6.1.4 The fuel system shall be designed to supply fuel to the engine within 10 s of the engine being energized and automatically stop the supply of fuel within 10 s of the engine being de-energized.

6.2 Fuel tanks

6.2.1 Materials prohibited for fuel tanks

6.2.1.1 A fuel tank shall not be constructed of terneplate.

6.2.1.2 Unless it has an inorganic sacrificial galvanic coating on the inside and outside of the tank, a fuel tank shall not be constructed of black iron or steel.

6.2.1.3 A metallic fuel tank encased in cellular plastic or in fibre-reinforced plastic shall not be constructed from a ferrous alloy.

6.2.2 Fuel level indication

A means shall be provided to check the fuel level, or a reserve fuel supply shall be provided.

6.2.3 Tank pressure limitation

With the personal watercraft in its static floating position, a fuel tank, when filled, shall have an air-expansion volume or be equipped with a system that prevents pressure in the tank from exceeding 80 % of the fuel tank design pressure.

6.2.4 Fill and vent openings

Fill and vent openings shall be at or above the liquid level when the tank is filled to its rated capacity with the personal watercraft in its static floating position.

The vent-line termination or a gooseneck in the vent-line routing shall be arranged at sufficient height to prevent spillage of fuel through the vent line during filling under normal operating conditions of the personal watercraft.

6.2.5 Fuel tank static-pressure test

6.2.5.1 A representative fuel tank shall not leak if tested using the procedures specified in 6.2.5.2 and 6.2.5.3.

6.2.5.2 Fill the tank with air or inert gas to exceed 80 % of the maximum test pressure of 21 kPa.

6.2.5.3 Tank fittings and seams shall be checked for leaks using a method other than the pressure drop test.

NOTE Soapy test solutions must be non-corrosive and non-toxic. Ammonia, present in some soaps and detergents, creates a condition that attacks brass fittings like those used in fuel systems. Damage can be undetectable at first, and these fittings can develop cracks in a matter of months creating a very hazardous situation.

6.2.6 Fuel tank shock test

6.2.6.1 A representative fuel tank shall not leak when shock tested using the procedures specified in 6.2.6.2 to 6.2.6.7.

6.2.6.2 Confirm that the tank does not leak when pressure tested according to 6.2.5.

6.2.6.3 If the tank is non-metallic, precondition the tank by filling it to capacity with petrol that has at least a 50 % aromatic content. Keep the fuel in the tank at 21 °C or higher for at least 30 days prior to testing.

6.2.6.4 Mount the empty shock test tank on an impact-test machine platform in a manner similar to how the tank is installed in the personal watercraft.

6.2.6.5 Fill the tank to capacity with water.

6.2.6.6 Apply 1 000 cycles of vertical accelerations of 245 m/s^2 at a rate of 80 cycles or less per minute. Apply the accelerations within 76 mm of the centre of the horizontal mounting surface of the tank. The duration of each vertical acceleration cycle measured from the base of the shock envelope shall be between 6 ms and 14 ms.

6.2.6.7 Check the tank for leaks using the procedure specified in 6.2.5.

6.3 Fuel tank installations

6.3.1 Non-encased metallic fuel tanks

6.3.1.1 Each fuel tank shall not support a deck, bulkhead or other structural component.

6.3.1.2 Fuel tanks shall not be integral with the hull or engine.

6.3.1.3 Each metallic fuel tank installed shall allow water to drain from the top surface when the personal watercraft is in its static floating position.

6.3.1.4 Each fuel tank support, chock or strap that is not integral with a metallic fuel tank shall be separated from the tank surface by a material that does not absorb moisture.

6.3.1.5 Cellular plastic shall not be the sole support for a metallic fuel tank.

6.4 Fuel tank filling system

6.4.1 Each fuel fill opening shall be located so that, when the personal watercraft is in its static floating position, a fuel overflow of up to 19 l/min for at least 5 s does not enter the enclosed compartments of the personal watercraft when all compartment openings are closed.

6.4.2 Each hose in the tank filling system shall be secured to a pipe, spud or hose fitting by a method that prevents leaks and prevents the hose from becoming disconnected.

6.5 Fuel pumps

6.5.1 Each fuel pump with a diaphragm shall not leak fuel into the personal watercraft if the primary diaphragm fails.

6.6 Fuel stop valves

Each electrically operated fuel stop valve in a fuel line between the fuel tank and the engine shall open only when the ignition switch is on.

6.7 Fuel filters and strainers

Each fuel filter and strainer shall be supported on the engine or watercraft structure independent from its fuel-line connections, unless the fuel filter or strainer is inside a fuel-system component.

6.8 Spud, pipe and hose fitting

Except when used for a tank filling line, each spud, pipe or hose fitting used with hose clamps shall have a bead, flare or a series of annular grooves or serration no less than 0,4 mm in depth.

6.9 Clips, straps and hose clamps

6.9.1 Clips, straps and hose clamps shall be of a corrosion resistant material and shall not cut or abrade the fuel line.

6.9.2 Hose clamps, when used, shall be used with fuel hose designed for clamps.